

## Planning

### Electrical layout

#### Module Selection

For detailed key electrical data, please refer to the product data sheet for the respective product.

- For maximum energy yields, mismatches of specified electric current ( $I_{mp}$ ) of more than 5% should be avoided for all modules connected in series.

#### Safety Factor

During normal operation, a module may generate a greater current and / or higher voltage than that determined under standardized test conditions. Accordingly, the values of  $I_{sc}$  and  $V_{oc}$  marked on the module should be multiplied by a factor of 1.25 when determining:

- the component voltage ratings,
- conductor ampacities,
- fuse sizes,
- size of controls connected to the PV output.

Refer to Section 690-8 of the National Electrical Code for an additional multiplying factor of 125 percent (80 percent derating) which might be applicable.

- Please follow the valid national guidelines for the installation of electrical systems (refer to section 690-8 of the NEC for an additional multiplying factor of 125 percent [80 percent derating] which may be applicable).

#### Series Connection

Connection of modules in series is only permitted up to the maximum system voltage as listed in the applicable data sheet.

- Take into account all possible operating situations and all relevant technical norms and regulations when designing the system. This will ensure that the maximum system voltage, including all necessary safety margins, is not exceeded.
- Take the voltage limit of the inverter into account when determining the maximum number of modules in the string.

#### Parallel Connection

Modules may be damaged by the occurrence of reverse currents (caused by module defects, ground leaks, or defective insulation).

- Ensure that the maximum reverse current load capacity indicated in the data sheet is met.

In order to limit reverse currents that may occur, we recommend using the following safety options:

##### 1) Layout with a limited number of parallel connected strings:

Without undertaking further current blocking measures, a maximum of two module strings may be operated in parallel on a single inverter or MPP tracker.

##### 2) Layout with string fuses:

Use overcurrent devices (e.g. fuses) according to the relevant standards in each string. Use gPV-fuses according to IEC 60269-6. Observe the maximum permitted number of strings as indicated in the specifications provided by the respective string fuse manufacturer and the technical guidelines.

#### NOTE!

When installing different product versions, the lowest minimum permitted reverse current load capacity applies.


#### Inverters

Inverters with or without transformers may be used.

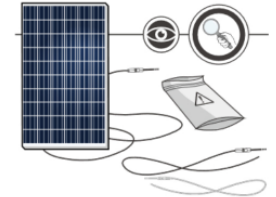
## Installation

### Safety and transport

⚠ → Ensure that all personnel are aware of and adhere to accident-prevention and safety regulations.  
→ While working wear clean gloves.



⚠ **Danger! Risk of fatal injury due to electric shock!**  
→ Do not install damaged modules.  
→ Inform your distributor of any damages immediately.



⚠ → Inspect the packaging for damages.  
→ Contact the transport company regarding any damage to the packaging and follow their instructions.  
→ Follow any instructions on the packaging.



⚠ **Warning! Fire Risk!**  
→ Do not install modules indoors.  
→ Do not install modules on moving objects.



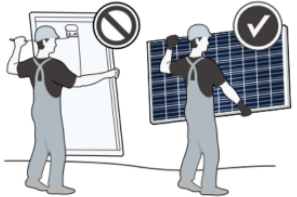
⚠ → Leave modules in their original packaging until installation.  
→ Store the modules securely in cool and dry rooms. The packaging is not weatherproof.



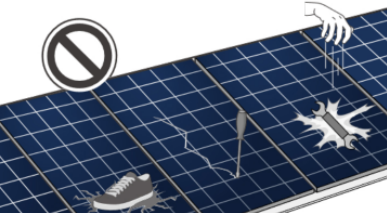
## Installation

### Safety and transport


**!** Note! Module damage may occur!  
→ Never lift or move the module with the connection cables or junction box.  
→ Carry modules upright and horizontally as shown.



**!** Note! Module damage may occur!  
→ Never step on modules.  
→ Do not subject modules to any mechanical stress.  
→ Do not allow any objects to fall onto modules

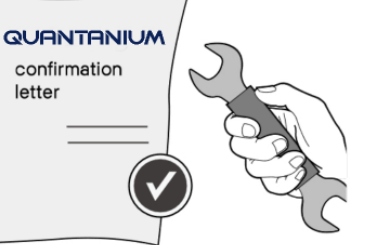


**!** Note! Module damage may occur!  
→ Do not drop modules.



**!** Note! Module damage may occur!  
→ Only make modifications to the module which have been confirmed in writing by Quant


**QUANTANIUM**  
confirmation  
letter



**!** Note! Module damage may occur!  
→ Do not stack modules.



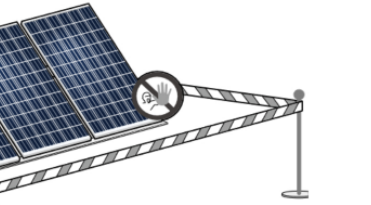
**!** Note! Module damage may occur!  
→ Do not install modules near flammable gas/vapors.  
→ Do not install modules in close proximity to air conditioning systems.



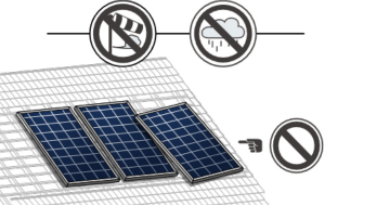
## Installation

### Preparation of installation

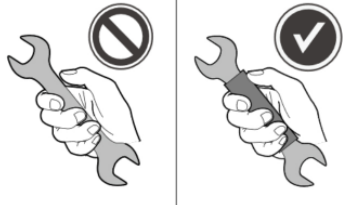
**!** Danger! Risk of fatal injury due to electric shock!  
→ Block off the installation zone.  
→ Keep children and unauthorized individuals away from the solar power system.



**!** Warning! Risk of injury due to falling modules!  
→ Secure modules during installation.  
→ Do not install modules in windy or wet weather.




**!** Danger! Risk of fatal injury due to electric shock!  
→ Only use dry, insulated tools.



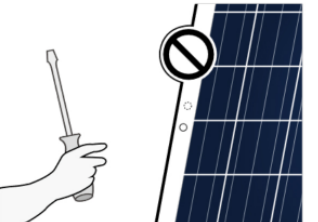
**!** → Do not carry out the installation alone.



**!** Danger! Risk of fatal injury due to electric shock!  
→ Ensure that modules and tools are not subject to moisture or rain at any time during installation.



**!** → Only install undamaged modules and components.  
→ Do not modify the module (e.g. do not drill any additional holes).

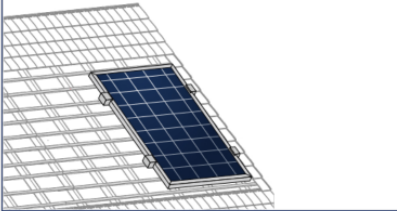


## Installation

### Module installation

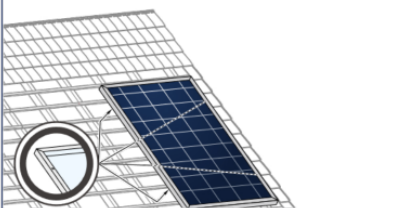
**Option 1:**

- Fasten the module with 4 clamps in the specified clamping range, see Fig. 3 , p. 8.
- Tighten clamps according to manufacturer's instructions.



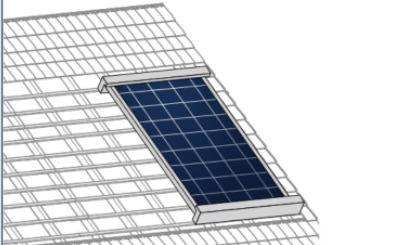
**Option 2:**

- Install the module at the 4 mounting points, see Fig. 3 , p. 8.
- Tighten screws according to manufacturer's instructions.

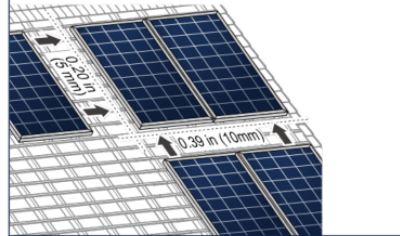


**Option 3:**

- Install the module using mounting profiles, see Fig. 2 , p. 6.

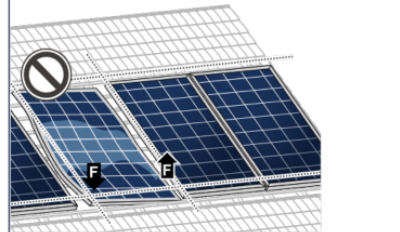


→ Maintain an interval of at least 0.39 in (10 mm) between two modules along the short side and 0.20 in (5 mm) along the long side.



**! Note! Module damage may occur!**

- Do not subject modules to mechanical tension. Max. torsion 0.12 in/ft (10 mm/m).



## Electrical connection

### Safety

**! Danger!**  
**Risk of fatal injury due to electric shock!**

When disconnecting an electric circuit carrying direct current, electric arcs can occur that may result in life-threatening injuries.

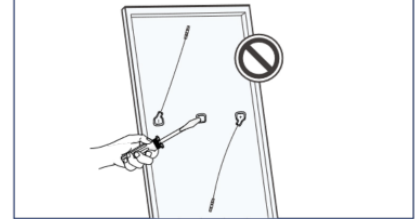
- Do NOT unplug the cable when under load.
- Do NOT connect any exposed cable ends.
- Electrical work may only be performed by qualified and skilled personnel (see page 3).

**A solar module generates electrical current and voltage even at a low intensity of illumination. Sparks and electric arcs may result from the separation of a closed circuit. These can result in life-threatening injuries. The danger increases when several modules are connected in series.**

- Please be aware of that the entire open circuit voltage is active even at low levels of solar irradiation.
- Please follow the valid national regulations and safety guidelines for the installation of electrical devices and systems.
- Please make sure to take all necessary safety precautions. With module or phase voltages of more than 120 V, the safety extra-low voltage range is exceeded.
- Carry out work on the inverter and the wiring with extreme caution.
- Ensure that the modules are disconnected at the inverter prior to separation.
- Be sure to observe the time intervals specified by the inverter manufacturer after switching off the inverter.
- Make sure that the plugs can not be connected unintentionally.
- Before working on the contacts, check them for safety extra-low voltage.

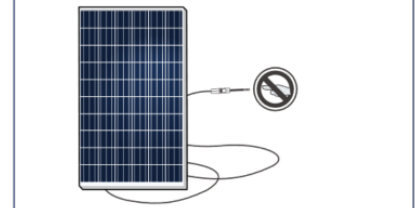
**! Danger! Risk of fatal injury due to electric shock!**

- Never open the junction box.
- Do not remove bypass diodes.



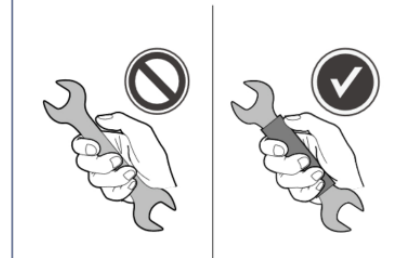
**! Danger! Risk of fatal injury due to electric shock!**

- Never touch live contacts with bare hands.
- Cover connectors by suitable protective caps until installation.



**! Danger! Risk of fatal injury due to electric shock!**

- Only use dry, insulated tools for electrical work.



**! Danger! Risk of fatal injury due to electric shock!**

- Insulate any exposed cable ends.
- Only connect cables with plugs.

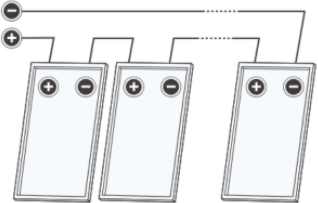


## Electrical connection

### Electrical installation safety

**⚠ Danger! Risk of fatal injury due to electric shock!**

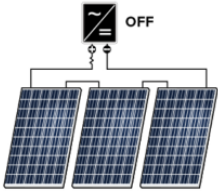
- Electrical work may only be performed by qualified and skilled personnel (see page 3).
- Ensure correct polarity.



**⚠ Danger! Risk of fatal injury due to electric shock!**

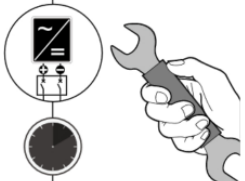
- Never plug or unplug the cable when under load. Modules must not carry any current.

1. Switch off the inverter.

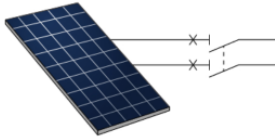


**⚠ Danger! Risk of fatal injury due to electric shock!**

- Be sure to maintain the time intervals as specified by the inverter manufacturer between switching off the inverter and beginning any further work.



2. Switch off the DC circuit breaker.
3. Measure shutdown in DC String. (no DC current flow).
4. Disconnect plugs by the use of appropriate and qualified tools of the manufacturer.
5. When connecting the modules proceed in reverse order.

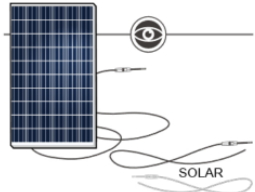


## Electrical connection

### Connection of modules


**⚠**

- Use solar cables for the connection at the junction box outlet.
- Only interconnect connectors of the same type and manufacturer.
- Use minimum No. 12 AWG copper wires insulated for a minimum of 90°C for field connections.



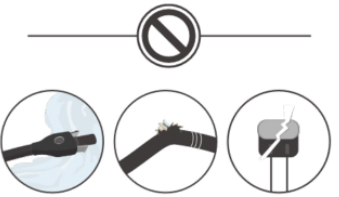
**⚠ Note! Module damage may occur!**

- Ensure that the cabling is not under mechanical stress (Comply with bending radius of  $\geq 2.36$  in (60 mm)).
- Ensure that the cables do not run between module and mounting rail or structure (danger of pinch).



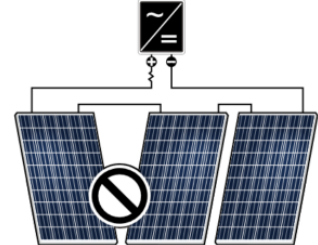
**⚠ Danger! Risk of fatal injury due to electric shock!**

- Ensure that all electrical components are in a proper, dry, and safe condition.



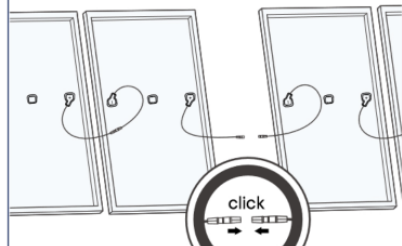
**⚠**

- Do not connect modules with different orientations or angles of inclination in the same string.



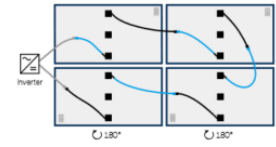
**⚠**

- Ensure for a tight connection between the plugs. Plugs click together audibly.



**⚠**

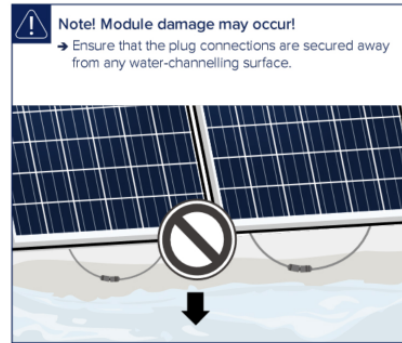
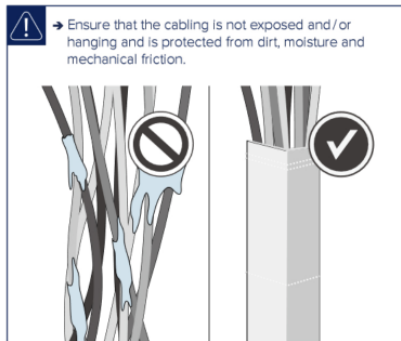
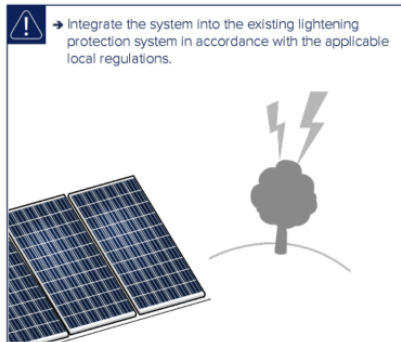
- To avoid complex cabling arrangements, it is often advantageous to rotate some modules 180°.
- Module orientation can clearly be identified from the front side by the serial number and barcode labelled behind the module glass on the side with negative connection cable.





## Electrical connection

### After installation



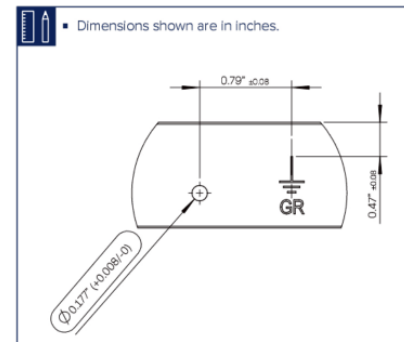
## Grounding

### Protective Grounding

In order to prevent electrical shock or fire, the frame of the module as well as any non-current-carrying metal parts of the system must be grounded. While this section provides some information about grounding the Quant frames and modules, reference should be made to local statutes and regulations for specific requirements on grounding. The U.S. National Electrical Code addresses these issues in Article 250. A module with exposed conductive parts is considered to be in compliance with this standard only when it is either electrically grounded in accordance with the manufacturer's instructions and the requirements of the National Electrical Code, ANSI/NFPA 70 (2014-2017), or when the bonding means has been evaluated with this module to UL 2703.

Proper grounding is achieved by bonding all exposed non-current-carrying metal equipment to the appropriately sized equipment grounding conductor (EGC) or racking system that can be used for integrated grounding.

Quant frames are protected from corrosion with an anodized coating, which has to be penetrated in order to ensure proper bonding. The different methods listed below are suggested methods for an appropriate bond between the frame and the EGC or racking system (that will have to be properly grounded). The method appropriate for any individual installation will depend on multiple factors.



### Option A: Use of a grounding lug

A listed grounding lug can be bonded to the frame using the grounding holes pre-drilled in the frame. These holes are marked with a ground symbol, as shown below on the frame section drawing. To install the grounding lug, follow the specified instructions of the manufacturer. The grounding lug should be made of stainless steel or tin plated metals such as aluminum to avoid corrosion.

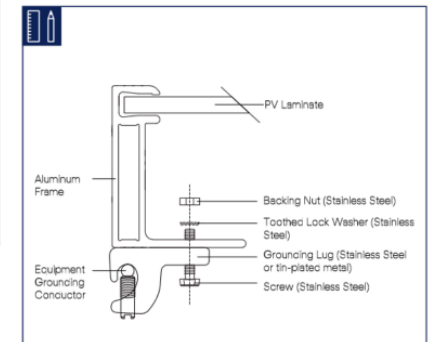
The grounding lug should be attached to the frame grounding hole using a stainless steel screw, toothed lock washer or KEPS nut (in order to penetrate the anodized layer) and backing nut. Care should be taken to avoid the use of grounding hardware of dissimilar metals, which may lead to corrosion.

### Option B: Integrated grounding methods

The Quant modules can be bonded with the racking system using UL1703 or UL2703 certified integrated grounding methods. The racking system will then have to be grounded so that the overall system is properly grounded. The listed racking system and grounding device should be installed in accordance with the manufacturers' instructions. An example of such integrated grounding method is the use of a WEEB clip or Schletter plate between the module and the racking system, when mounting the module.

The WEEB washers are generally compatible with Quant modules, however each combination module/racking system requires a specific WEEB washer size. Note that WEEB clips are intended for single use only; they must not be reused after removal or loosening. Refer to Wiley's installation instructions for the specific use of WEEB washers.

An example of such integrated grounding method is the use of a washer recognized as meeting UL2703 requirements between the module and the racking system, when mounting the module. For example, WEEB washers are generally compatible with Quant modules, however each combination module/racking system requires a specific WEEB washer size. Note that WEEB washers are intended for single use only; they must not be reused after removal or loosening. Refer to Wiley's installation instructions for the specific use of WEEB washers.



## Faults and defects



### Danger!

Risk of fatal injury due to electric shock!

- Do not attempt to fix any problems yourself (e.g., glass cracks, damaged cables).
- Please contact an installer or Quant Technical Customer Service Department.

## Disposal

- Do not disconnect modules yourself.
- Please commission a trade specialist.
- Dispose of modules in accordance with the local disposal regulations.

## Maintenance and cleaning

Quant solar modules are known for a long operating life and minimal maintenance effort and expense. Dirt and grime are usually washed away by rain. If the module is fully or partially shaded by dirt or debris (e.g., plants, bird droppings), it needs to be cleaned to prevent a loss of performance.

### Maintenance

- The PV system has to be inspected regularly by certified personnel.
- The time intervals and extent of the inspection can depend on local circumstances (e.g. salt, ammonia content in the air, high humidity etc.). The customer/operator must inform himself about time intervals and extend of necessary inspections.
- Inspections have to be performed especially after extraordinary events (e.g. storm, hail, high snow loads etc.)
- During the inspections it has to be checked that the components are secure, undamaged and clean.

### Cleaning



#### WARNING!

Risk of injury due to hot and live modules!

- Only clean modules that have cooled down.
- Do not carry or wear any electrically conductive parts.



#### WARNING!

Risk of falling due to unsecured access!

- Never access the installation area alone or without taking adequate security precautions.
- Please commission a trade specialist.



#### NOTE!

Module surface damage may occur!

- Remove snow and ice carefully without force (e.g. with a very soft broom).
- Do not scratch off dirt.
- Module cleaning has to be done by qualified personnel according to the state of the art and taking into account all relevant safety issues and general product properties, e.g., but not restricted to:
  - electrical safety
  - mechanical stability (load limits depending on the actual mounting options)
  - chemical suitability (no effect to any of the module's components, e.g. cable, connector, silicone)
  - no abrasive materials.



#### NOTE!

Dust and dirt are abrasive materials!

- The situation for each individual project (or type of dirt) must always be professionally evaluated.
- Wrong cleaning may cause damages such as, but not limited to, damages to the glass surface (e.g. scratches) and AR coating, power loss, delamination, loss of frame-to-laminate bond, reduced snow and wind load capability etc.

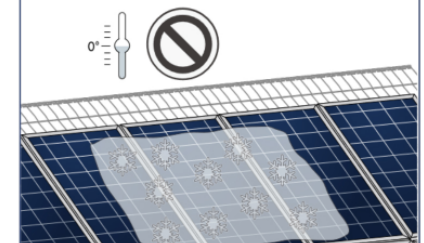
Apart from the above, each customer is free to choose the method of cleaning. However, possible damages, caused by the cleaning or related to the cleaning tools or agents shall not be covered by the module's Product and Performance Warranty. Therefore it is recommended to use only the tools and agents which have already been successfully tested and used with PV modules, to prevent possible damage.

Isopropyl alcohol (IPA) can be used selectively to remove stubborn dirt and stains within one hour after emergence.



#### Note! Module damage may occur!

- Do not clean modules with water if there is a risk of frost.



- Free the substructure from any dirt and debris (leaves, bird nests, etc.).

